

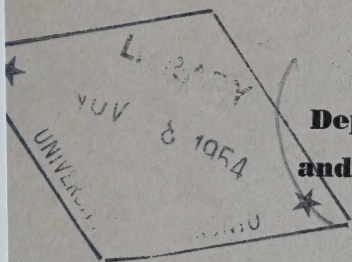
Gov. Doc
Can
M

Canada, Mines, Bureau of
Explosives Division.



Canada

Department of Mines
and Technical Surveys



Annual Report of the

EXPLOSIVES DIVISION

Calendar Year
1952



Canada

**Department of Mines
and Technical Surveys**

Report of the

EXPLOSIVES

DIVISION

Calendar Year 1952


by

W. P. CAMPBELL

Chief Inspector

CONTENTS

	PAGE
Offices.....	5
Manufacture of Explosives.....	5
Magazines, Registered and Unlicensed Premises.....	5
Prosecutions.....	6
Thefts.....	6
Destruction of Explosives.....	6
Imports.....	6
Explosives Laboratory.....	7
Accidents.....	8
In Manufacture.....	8
In Use.....	9
Miscellaneous.....	10
Appendices—	
A. Factories licensed to manufacture explosives.....	12
B. Production of explosives in Canadian factories during the year	13
C. Explosives imported into Canada.....	14
D. Accidents from explosives 1952:	
Part I Statistical compilation of accidents.....	15
Part II Playing with detonators.....	16
Playing with other explosives.....	17
Miscellaneous.....	19
E. List of authorized explosives.....	20



Digitized by the Internet Archive
in 2025 with funding from
University of Toronto

<https://archive.org/details/31761120019518>

The following report deals with the administration of the Explosives Act during the year ended December 31, 1952, supplementing the brief report of the Explosives Division in the Annual Report of the Department for the fiscal year 1952-53.

OFFICES

The main office of the Explosives Division is in the Motor Building, 238 Sparks Street, Ottawa. Branch offices are at 300 West Pender St., Vancouver, B.C. and 7 Terminal Road, Halifax, N.S. The Explosives Testing Laboratory in the N.R.C. Annex, Montreal Road, Ottawa, continues to be maintained jointly by the Department of Mines and Technical Surveys and the National Research Council.

MANUFACTURE OF EXPLOSIVES

The factories, 19 in number, licensed under the Explosives Act and in operation during the whole or part of 1952 are detailed in Appendix A. An event of some importance was the licensing of a new factory of Canadian Industries Limited at Ogden, Alberta, which began operation in April 1952. It is the first in North America to use the "Biazzi" process to make nitroglycerine. This installation marks a new departure from the "batch" system of production which has been followed since 1874 when the first nitroglycerine plant was built in Canada by Mowbray near Kingston, Ontario. The principal advantages of the Biazzi process are its many safety devices, its precise control of nitration and purification and its low explosion risk. For the first time also, in Canada, use is made in this factory of self-discharging mixers, a great labour-saving innovation.

Inspectors of the Division made 34 factory inspections in 1952 and consulted frequently with manufacturers on matters connected with licences and amendments thereto, made necessary by changing requirements.

Appendix B is a statement of the total production of explosives arranged according to classes. Classes 1 to 3 embrace all commercial blasting explosives, propellants and other high explosives. It may be noted that explosives of Division 1 of Class 3, the largest single group, approximate 120,000,000 pounds, a new production record which exceeds by about 7,000,000 pounds that of 1951, the previous peak year.

MAGAZINES, REGISTERED AND UNLICENSED PREMISES

Each year for many years the number of magazine licences in force has shown a substantial increase with 1952 recording the highest number to date. Permanent licences increased from 389 to 410, temporary licences from 819

Explosives Division

to 914 and certificates for Registered Premises from 74 to 82. Inspections of factories, magazines, etc., carried out by inspectors of the Division, assisted by deputy inspectors of the R.C.M.P. totalled:

Factories.....	34
Magazines.....	1,371
Registered Premises.....	107

In addition, over 3,000 unlicensed premises, including premises of dealers selling small arms ammunition, were inspected or visited by inspectors and deputy inspectors.

PROSECUTIONS

Proceedings for breach of The Explosives Act and Regulations thereunder were taken in 11 instances. Ten convictions were obtained and fines imposed. A trucking firm was fined for violation of Part VI, Regulations for the Transportation of Explosives. A 50-pound case of dynamite and a box of detonators were stowed together in a semi-trailer with general merchandise. A fire started in the trailer from which the driver succeeded in separating and removing the tractor. As he had no adequate means of fighting the fire, it continued to burn for about 2 hours, when an explosion occurred that completely destroyed the trailer and the remainder of the load. Other offences included improper storage of explosives and failure to comply with the Terms of Licence. Two employees of a factory were fined for smoking in a prohibited area.

THEFTS

Eleven thefts of explosives were reported, involving about 150 pounds of blasting explosives, 7,079 detonators and 3,100 feet of safety fuse, some of which the police recovered. Thieves entered a building in a factory, apparently in search of nitroglycerine; they tampered with a settling tank but stole no nitroglycerine.

DESTRUCTION OF EXPLOSIVES

Explosives destroyed amounted to 88,682 pounds of blasting explosives, (among which were 3 large lots of deteriorated or abandoned explosives), 10,158 detonators, 11,212 feet of safety fuse, and about 150 pounds of rejected fireworks. Several tons of explosives were abandoned by mining companies and prospectors in various sections of Northwest Territories following a burst of mining activity from 1945 to 1947. These were found and destroyed by deputy inspectors of explosives. A flood in the Manitoulin district of Ontario was responsible for the deterioration and ultimate destruction of 13,550 pounds of explosives. Completion of a contract in an isolated area north of Seven Islands, Quebec, made it necessary to destroy 25,000 pounds of explosives; some was in good condition but much of it had deteriorated as a result of poor storage conditions.

Report for 1952

IMPORTS

Imported explosives, listed under the several classes and divisions, are shown in Appendix C. These imports were made under the authority of 720 explosives import permits and 17 special permits, the number issued showing a substantial increase over 1951 when 540 permits and 14 special permits were issued. Explosives of Class 3 consist almost entirely of nitro-compounds used for the manufacture of other explosives and in making lacquers. Much of the remainder represents imports of seismic survey explosives, oil well explosives and liquid nitroglycerine, also for oilfield use. Imports of fireworks in 1952 were more than double those of 1951, the bulk being made up of shipments of Chinese fireworks and firecrackers, although considerable quantities came from Great Britain and the United States.

EXPLOSIVES LABORATORY

The rapid expansion of the National Research Council at the Montreal Road Annex has put a strain on available laboratory space, and forced the Explosives Division to make plans for the construction of a new laboratory of its own elsewhere. A site was selected on River Road near Uplands Airport, Ottawa, about 7 miles from the centre of Ottawa, and plans have been prepared, tenders invited and a contract awarded for the construction of the new laboratory. Work commenced in December 1952. In its appointments and facilities the new laboratory will follow closely the general design of the present laboratory; it is expected to be ready for occupancy by the Spring of 1953.

The testing of explosives for authorization as prescribed in Regulations made under the Act is carried out at the Explosives Laboratory and in addition many check tests were made of samples selected by inspectors in the course of factory inspection duties. The Division also serves other Government departments in the testing and investigation of materials which may be, or are suspected of being, of an explosive nature. Such samples are submitted by the R.C.M.P., the Department of National Defence, the Post Office Department, National Research Council, Board of Transport Commissioners and other Government agencies. Special tests were also conducted for, and assistance given to explosives manufacturers. Members of the chemical and inspection staffs attended conferences and served on committees where their advice and experience were of service.

In all, 581 samples were received for chemical and physical examination, classified as follows:

Blasting explosives, etc.....	41
Fireworks including Chinese firecrackers and toy pistol caps.....	532
Miscellaneous.....	8

Investigation of the hazards attending the storage, handling and shipment of ammonium nitrate continues to receive attention. Calculations were made and tabulated of the energies and pressures developed during decomposition of ammonium nitrate, alone and when mixed with other ingredients.

ACCIDENTS

Accidents involving explosives are detailed in Appendix D. Those reported numbered 129, in which 45 people were killed or died from injuries and 135 were injured. For comparison, the average figures for the five years 1947-1951 inclusive were 135 accidents, 27 killed and 146 injured.

In Manufacture

In the manufacture of explosives 3 people died from injuries and 11 suffered minor injuries from which they recovered. No death or reported injury involving explosives occurred during 1952 in any plant manufacturing explosives of Classes 1 to 3, in spite of greatly increased production.

An explosion occurred on January 26 in the ammunition section of the Canadian Industries Limited Plant, Brownsburg. An operator received injuries to his left arm, necessitating amputation. Following the operation, complications set in, which although not directly connected with the accident, caused the operator's death. The explosion occurred while the operator was separating a small portion of the wet composition from the batch, to fill a charging plate with rimfire priming composition. Increased sensitiveness of the composition due to the loss of moisture or the presence of small particles of unwet powder in the batch, or undue pressure and friction, were considered to be possible causes of the explosion. The following changes have been made as a result of this accident:

- (a) The size of the batch brought to the filling table has been reduced.
- (b) Measures have been taken to ensure complete wetting of the composition.
- (c) The temperature of the wet batch is kept low by cold storage until time of use.
- (d) Additional protection for the operator has been provided by a shield and by rearrangement of the filling equipment.

On December 29 a fire occurred in a filling shop at the Cooksville Plant of T. W. Hand Fireworks Co. Ltd. The building was used for filling display shells with coloured stars. It was the duty of a carrier to keep the filling shop supplied with stars, and these were brought in wooden carrying boxes in 40-pound lots. The accident occurred at the mid-day break, just after the carrier had placed a box of stars on the work bench. Undue impact or friction between the heavy box and loose powder lying on the bench, to which the carrier's haste may have contributed, was the probable cause of the explosion. The flash which followed burned the two operators so severely that both died later in hospital. The following recommendations have been made:

- (a) Use tightly covered containers and smaller batches of stars.
- (b) Improve housekeeping and keep benches clean.
- (c) Re-examine and improve training of new employees.

Two fires occurred which resulted in considerable material damage but no loss of life or injury. A fire of undetermined origin completely destroyed the T.N.T. Plant of Canadian Industries Limited, Beloeil, on the night of

Report for 1952

January 11. The plant was not operating at the time and no one was in the building when the fire started. Although the fire consumed about 2,500 pounds of finished T.N.T. in graining kettles, there was no major explosion. Over 4,500 pounds of T.N.T. and D.N.T., also in the building, did not burn. A series of small explosions occurred during the course of the fire but ceased when the fire was brought under control. From the available evidence it was not possible to fix definitely the origin of the fire. The various explosions heard, appear to have occurred when the fire reached small quantities of explosives trapped in pipes and valves. A thorough search of the debris by the manufacturer failed to bring to light any definite clue as to the probable cause. This plant, most efficient in operation, had been producing granular T.N.T. prior to the last war; it has now been replaced by a new plant which uses the same nitration process but is built on slightly different lines.

Rough handling of a sheet of toy pistol caps or some similar inadvertent act of an operator caused a fire in the toy pistol cap factory of Macdonald Metals and Plastics Limited, Waterloo, P.Q. No one was injured but the building suffered considerable damage as the fire spread to other sheets of caps before it was brought under control. The following recommendations were made:

- (a) One sheet only should be handled at a time and with the utmost caution.
- (b) All boxes containing caps or uncut sheets of caps should be covered.
- (c) Employees should be taught to use emergency exits by instruction or drill.
- (d) Stricter segregation of the toy cap plant operations from other sections of the factory should be observed.

In other accidents 11 persons suffered minor injuries. These occurred in the manufacture of safety cartridges, detonators, and primers, largely because of the sensitive nature of some of the material used in their manufacture. The special protective measures employed, however, do much to prevent injuries to personnel and limit damage to machines and other equipment.

In Use

Accidents in the use of explosives showed an increase over 1951, 26 persons being killed and 84 injured compared to 18 killed and 81 injured the previous year. Although part of this increase might be expected on account of the greater quantity of explosives used, negligence and inexperience are still the chief contributing factors. The most common cause of accidents under this heading is remaining too long at the scene of the blast and the reason is often shown to be due to (a) failure to perceive that the fuse has been lit and is burning, (b) failure to allow sufficient time to light a round of shots, or (c) use of too short a fuse. Many casual users of explosives continue to depend on a burning match or a cigarette lighter to light safety fuse; both means may fail to light a fuse or, worse, mask a burning fuse, and in windy or wet weather they are

particularly hazardous. The safest and surest method is to use a fuse lighter but, failing that, a match-head, held against the core of a freshly cut fuse and struck with the striking surface of a match box, will make a good substitute. Farmers and others who blast stumps or field stones and have had little or no experience in the use of explosives should learn this safe method of lighting fuse. The Explosives Division has prepared a pamphlet illustrating this way of lighting fuse.

Other causes of accidents rank, after the above, in this order:

- (a) Returning too soon to the scene of the blast.
- (b) Projected debris.
- (c) Drilling into misfires.

Accidents arising from failure to allow sufficient time to elapse, when using safety fuse, are usually the result of impatience or a poor sense of the passage of time. Not infrequently when firing more than one shot the blaster may miscount the shots and, under the erroneous impression that all have fired, return to the scene just as a shot explodes. When there is the slightest doubt about a fuse, the recommended practice of waiting at least 30 minutes before returning should be followed. Projected debris from a blast often causes fatal accidents as it may follow a wholly unpredictable course. A person may consider himself well protected and be struck by flying rock or a piece of stump that has rebounded or ricocheted from some nearby object. The remedy lies in always being far enough away from the blast, preferably behind some substantial object. Drilling into misfires or unexploded charges is also a common cause of accidents in mines and construction work and is sometimes difficult to foresee and prevent. A careful examination should be made of the face after a blast and any misfires or suspected misfires should be marked and reported. No attempt should be made to withdraw the explosive, but it should be blasted at a proper time and under competent supervision.

A brief account of some of the accidents will illustrate the above and perhaps bring to the attention of someone the unusual circumstances attending them and the pitfalls that should be avoided:

A farm manager was blasting a stump in a clearing operation in British Columbia. Under the impression that the fuse had not ignited, or had gone out, he returned to relight it when the explosion took place and he was killed.

In Ontario a farmer and his 15-year-old son were blasting stumps on a neighbour's farm. The father delayed too long in lighting the fuse and both he and the son were caught in the blast and killed.

A coal miner in Nova Scotia took cover not far from the blast. A piece of rock flew from the shot and struck him on the head.

Two miners in Quebec were instructed to break up a large flat rock on a muck pile. They were told to wash down and examine the rock thoroughly for unexploded powder but as they found the rock too heavy to turn over they decided to drill into the top of it. After drilling 3 or 4 inches an explosion occurred that killed one man and seriously injured the other.

At a construction project in British Columbia a springing shot had been fired and as the men were in the act of blowing out the hole with compressed air

Report for 1952

an explosion occurred that killed one man and injured two others. It is thought that gases from the previous shot had been sealed in the hole under high pressure and when the air pipe was inserted the pressure was suddenly released with explosive force.

In Alberta a crew of men were blasting old cement 'drops' in an irrigation ditch. The cement was being broken up by mudcapping with two or three sticks of dynamite per shot, using a small hand blasting machine connected to the primed dynamite by a blasting cable 100 feet long. When the charge fired the cable was thrown on to an overhead high tension power line causing a short circuit and electrocuting the blaster who was holding the machine.

Miscellaneous

Miscellaneous accidents, of which the majority were the result of playing or tampering with explosives, accounted for 16 deaths and 40 injuries, a substantial increase compared to the 5 deaths and 36 injuries of the previous year. A brief report of these is given in Appendix D.

Of the 16 fatal accidents, 4 were suicides, an unusually high number, and 4 were caused by military explosives found by unwary individuals, usually children.

The other miscellaneous accidents, both fatal and those causing injury, were, in many cases, the result of negligence on the part of adults who left explosives where children had access to them. The importance of safeguarding small supplies of explosives at the place where they are used and of ensuring that all dynamite and detonators are accounted for when work ceases, cannot be stressed too much. Securely locked separate receptacles should always be provided for dynamite and detonators. Too often farmers and other casual users of explosives have hidden surplus explosives in barns, sheds and in the home in places they considered safe, only to discover at a later time—sometimes years afterwards—that their own or other children have found them with tragic consequences. The simple preventative measure of keeping explosives, especially detonators, in locked receptacles would eliminate most accidents to children.

APPENDIX A

Factories Licensed to Manufacture Explosives, 1952

Owner	Location of factory	General nature of product	Remarks
Canadian Industries Ltd.....	Beloeil, Que.....	Blasting explosives, black powders, propellants.	
Canadian Industries Ltd.....	James Island, B.C.	Blasting explosives.....	
Canadian Industries Ltd.....	Nobel, Ont.....	Blasting explosives.....	
Canadian Industries Ltd.....	Brainerd, Man....	Blasting explosives.....	
Canadian Industries Ltd.....	Brownsburg, Que..	Ammunition, detonators, fusees, etc.	
Canadian Industries Ltd.....	Calgary, Alta.....	Blasting explosives.....	
Canadian Safety Fuse Co.....	Brownsburg, Que..	Safety fuse, detonating fuse. Fuse lighters.	
Canadian Arsenals Ltd.....	Beloeil, Que.....	Time Ring Fuse Powder	
Canadian Arsenals Ltd.....	St. Paul l'Ermite, Que.	Filling military shells, fuses, etc.	
Canadian Arsenals Ltd.....	Valcartier, Que....	Filling military small arms ammunition.	
Canadian Arsenals Ltd.....	Valleyfield, Que...	Military explosives, propellants.	(Operated Nov. and Dec.)†
Defence Industries Ltd.....	Valleyfield, Que...	Military explosives, propellants.	(Operated Jan.-Oct.)
North American Cyanamid Ltd.....	Niagara Falls, Ont.	Nitroguanidine.....	
T. W. Hand Fireworks Co.....	Cooksville, Ont....	Fireworks and military pyrotechnics.	
Macdonald Metals and Plastics	Waterloo, Que.....	Toy pistol caps.....	
Montreal Fireworks Co.....	Ville St. Pierre, Que.	Display fireworks.....	
Superior Toy Co.....	Waubaushene, Ont.	Toy pistol caps.....	
W. F. Bishop & Son.....	Unionville, Ont....	Fireworks.....	
Joseph J. Godin (Interstate Fireworks).....	Newmarket, Ont..	Fireworks.....	

Production of Explosives in Canadian Factories, 1952

	Quantity
Class 1. Gunpowder.....	
Class 2. Nitrate mixtures.....	461,675 lb.
Class 3. Nitro-compounds—	
Division 1.....	119,144,835 lb.
Division 2.....	25,091,060 lb.
Class 6. Ammunition*—	
Division 1—	
Safety Cartridges (rounds).....	202,283,080
Safety fuse and primacord.....	Output of one factory
Railway Track Signals.....	Output of one factory
Percussion caps.....	Output of one factory
Division 3—	
Detonators and electric detonators.....	Output of one factory
Class 7. Fireworks—	
Division 2—	
Commercial and display fireworks, fuse lighters, toy caps and fusees. (Approx. value).....	\$1,681,105

* Exclusive of artillery ammunition and small arms ammunition made in Government factories.

APPENDIX C

Explosives Imported into Canada, January 1 to December 31, 1952

Class	Division	Description	Quantity
1	.....	Gunpowder.....	89,881 lb.
2	.....	Nitrate Mixtures.....	120,837 lb.
3	1	Mixtures containing liquid nitro-compound.....	2,955 lb.
	2	Nitro-compounds:	
		(a) Propellants.....	260,422 lb.
		(b) For use in explosives factories.....	1,749,018 lb.
		(c) For other manufacturing purposes.....	3,367,877 lb.
4	.....	Chlorates.....	
5	.....	Fulminates.....	700 lb.
6	1	Primers.....	225,800 only
	1	Safety Fuse.....	35,000 ft.
	2	Miners' Squibs.....	20,000 only
	2	Detonating Fuse.....	72,000 ft.
	2	Blasting Cartridges.....	587,736 lb.
	3	Detonators.....	397,140 only
		Miscellaneous.....	45,127 lb.
7	.....	Manufactured Fireworks.....	872,210 lb.

APPENDIX D
Part I

Accidents from Explosives during the Calendar Year 1952

Circumstances or Cause	Mines and Quarries, Number of				Elsewhere, Number of				Totals, Number of	
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured	Injured
Use—										
(a) Prematures, and failing to get away from shot hole	15	3	20	7	6	3	22	9	23	
(b) Firing by electricity when persons are at shot hole				1			1	1	1	
(c) Not taking proper cover	4	1	3	5	2	3	9	3	6	
(d) Projected debris	8		8	4		4	12		12	
(e) Hangfires, and returning too soon to shot hole	7	1	8	5	5	2	12	6	10	
(f) Tampering with misfired shots	1		3				1		3	
(g) Ramming or stemming the charge				1		2	1		2	
(h) Sparks, flame, etc.										
(i) Boring into unexploded charge	8	3	9	3		4	11	3	13	
(j) Striking unexploded charge in removing debris	4		5				4		5	
(k) Preparing charges	2		2				2		2	
(l) Lighting fuse before inserting charge										
(m) Fumes	2	2	4				2	2	4	
(n) Springing or socketing shots				1	1	2	1	1	2	
(p) Various				3	2	1	3	2	1	
	51	10	62	29	16	22	81	26	84	
In Manufacture							11	3	11	
In Keeping										
In Conveyance (other than by railway)							1			
TOTAL							* 12	3	11	
Miscellaneous—										
(a) Playing with detonators							8	1	14	
(b) Playing with other explosives							16	5	18	
(c) Various							12	10	8	
TOTAL							** 36	16	40	
TOTALS all circumstances	51	10	62	29	16	22	129	45	135	

* Except for these, accounts of which are given in the text, the accidents given in this table occurred in circumstances not directly controlled by the Act.

** Circumstances are given on next page.

APPENDIX D

Part II

Playing with Detonators

Ref. No.	Cause of Accident	Killed	Injured
10	Two soldiers found a discarded blasting cap in a doorway. A lighted cigarette held to the cap caused it to explode. One man lost the thumb of his right hand and the other suffered burns and cuts to the right hand.....		2
27	Boy, age 15, found a detonator left by work crew. While playing with it he caused it to explode receiving injuries to his right hand and face.....		1
35	Four children ages 3 to 10 found a blasting cap and inserted it in a toy gun. It exploded shattering the gun and injuring the children by flying pieces of metal.....		4
62	Boy, age 10, was given a jar containing 21 blasting caps by a neighbour who did not know what they were. He struck one with a hammer. In the explosion he lost three fingers of his left hand and his right hand was lacerated.....		1
86	Boy found a dynamite cap near a shed on his grandfather's farm. He tried to light it with a match and lost his thumb and index finger in the resulting explosion.....		1
143	Two boys ages 5 and 7 received serious facial bruises and injuries to their eyes when they tossed a tin of 15 dynamite caps that they found in their yard into a bonfire.....		2
166	An 11-year-old boy was killed and two companions injured when they lit a fire in a cardboard carton containing 4 detonators, which they had found near a coal mine.....	1	2
177	Youth, age 17, had three fingers blown off his hand when he exploded a blasting cap which he and some others had found in the remains of an old house.....		1

Report for 1952

APPENDIX D—Continued

Part II—Continued

Playing with Other Explosives

Ref. No.	Cause of Accident	Killed	Injured
2	Youth, age 17, had his right hand blown off when some home-made gunpowder exploded.....		1
95	Boy, age 15, was making a bomb by sealing chemicals in a length of iron pipe when it exploded imbedding a large fragment of metal in his forehead. He also suffered severe lacerations to his right hand.....		1
96	Three boys ages 12 to 16 attempted to make a home-made sky rocket. While forcing the ingredients into the metal container it exploded. One boy lost four fingers of his right hand, the others received cuts and burns.....		3
174	An amateur chemist age 30 blew himself to pieces when he tried to make an "atomic bomb".....	1	.....

Dynamite

72	Farmer was helping a neighbour destroy 3 sticks of dynamite left over from a job, by attaching short lengths of fuse, lighting and throwing them in the river. He held one too long and lost his right hand. The neighbour received burns to the face.....		2
----	--	--	---

Small Arms Ammunition and Torpedoes

75	Boy, age 13, set off a live bullet by hammering the cap. Several pieces of metal were inbedded in his arm.....		1
78	Boy, age 8, received serious chest wounds when a bullet he tossed into a fire exploded.....		1
80	Two youths and a man were injured by flying glass when they placed lighted firecrackers in a milk bottle.....		3
126	Girl, age 6, escaped with minor injuries when struck by flying fragments of a cartridge set off when struck with a hammer.....		1
137	Boy, age 9, was watching a friend hammer a .22 calibre rifle bullet. He received injuries to his shoulder when the bullet exploded.....		1

APPENDIX D—Continued

Part II—Continued

Playing with Other Explosives—Continued

Ref. No.	Cause of Accident	Killed	Injured
Fireworks			
73	Four children ages 12 to 15 were burned by lighted firecrackers thrown by other children.....	.....	4
144	Boy, age 10, found a railway torpedo which he placed on a cement block and struck it with a stone. It exploded causing injuries to his hands, face and eyes.....	.....	1

Military Explosives

17	A 13-year-old boy was blown to pieces trying to dismantle a three-inch mortar bomb that had been brought home as a war souvenir 10 years before.....	1	.....
48	Youth, age 16, was killed while playing with a No. 69 grenade he had found in the woods near his home.....	1	.....
97	Boy, age 13, used an axe to open a war souvenir mortar bomb which had been in the house five years and had been thrown in the ash can. He was killed in the resulting explosion.....	1	.....
107	Man found a mortar bomb on a dump. He tried to take it apart with a wrench and he was killed in the explosion that followed.	1	.....

APPENDIX D—Concluded

Part II—Concluded

Playing with Other Explosives—Concluded

Various

Ref. No.	Cause of Accident	Killed	Injured
21	Man, age 50, committed suicide with dynamite.....	1	.....
87	Man, age 80, committed suicide with dynamite.....	1	.....
103	One soldier was killed and three injured in a premature explosion of ammunition during range practice.....	1	3
104	Two construction workers were killed and three injured when a rifle bullet, fired by one of the men, struck a dynamite cache of 900 cases.....	2	3
109	A 31-year-old lumberjack blew himself to pieces with two sticks of dynamite.....	1	.....
110	A Navy mine disposal officer was killed and his assistant injured when a wartime mine he was examining exploded.....	1	1
125	A civic employee was burned about the face and arms when a carton containing gunpowder exploded on a city dump.....	.....	1
140	A young immigrant loaded a piece of pipe with dynamite for the purpose of blasting fish. The "bomb" exploded prematurely and he was killed.....	1	.....
165	During a fireworks display a rocket shot into the crowd fatally injuring a woman spectator.....	1	.....
184	Man, age 41, committed suicide with dynamite.....	1	.....
187	Man suffered burns to his right hand when he seized a lighted sky-rocket that had fallen to the ground during a fireworks display.....	.....	1
202	Two persons were slightly injured while illegally breaking down shot shells.....	.....	2

APPENDIX E

Authorized Explosives

Authorized explosives manufactured by Canadian firms:

Canadian Industries Limited (Explosives Division)

Ammonia Dynamite—20, 25, 30, 35, 40, 50 and 60 per cent.
 Ammonia Dynamite quarrying—60 per cent.
 BL-100—60 per cent.
 Black Blasting Powder.
 Black Sporting Powder.
 Blastol—60 per cent.
 BRX-7—75 per cent.
 BRX-7 (D.N.T.)—75 per cent.
 Cilgel—50 per cent.
 Cilgel (D.N.T. or T.N.T.)—50 per cent.
 Cordite—MD, MDT, W, WT, WM, WMT.
 C-X-L Dynamite—Nos. 1, 2, 3 and 4.
 C-X-L Gelatin—Nos. 1 and 2.
 C-X-L-lite.
 Di-Drill Gelatin—60 per cent.
 Ditching Dynamite—50 per cent.
 Ditching Dynamite (D.N.T.)—50 per cent.
 Driftite—70 per cent.
 Driftite (D.N.T. or T.N.T.)—70 per cent.
 Dygel—75 per cent.
 Dynamex (Diameters 1" to 1½" incl.)—40, 50, 60 and 70 per cent.
 Dynamex (Diameters 1½" and over)—40, 50, 60 and 70 per cent.
 Explosives BL-101
 BL-102
 BL-103
 Forcite—30, 35, 40, 40 (Asbestos Corporation)
 50, 60, 75, 75 (bagged)—80 and 90 per cent.
 Forcite (Brainerd Series)—30, 40, 50, 60 and 75 per cent.
 Forcite (D.N.T. or T.N.T. Series)—30, 35, 40, 40 (Asbestos Corporation)
 50, 60, 75, 75 (bagged)
 80 and 90 per cent.
 Free Running Ammonia Dynamite—65 per cent.
 Fuse Powders—30, 40, 44, 53, 57 and 65 seconds.
 Gelatin Dough—90 per cent.
 Gelignite—62 per cent.
 Giant Gelatin—30, 35, 40, 50, 60, 75, 80 and 90 per cent.
 Giant Gelatin (Brainerd Series)—40 and 60 per cent.
 Giant Gelatin (D.N.T. or T.N.T. Series)—20, 25, 30, 35, 40, 50, 60, 75, 80 and 90 per cent.
 Guhr Dynamite.
 Guncotton.
 Gunpowder.
 Gypsumite "A", "B" and "C".
 Hi-Velocity gelatin—60 per cent.
 Liquid Nitroglycerine.
 Lump-Kol Pellet Powder
 Nitrocotton.
 Pellet Powder No. 2.
 Polar Dynamite—20, 25, 30, 35, 40, 50 and 60 per cent.
 Polar Dynamite (straight nitroglycerine series)—25, 30, 35, 40, 50 and 60 per cent.
 Polar Monobel—Nos. 4, 6, 7, 10 and 14.
 Polar Monobel, sheathed—Nos. 4, 7 and 10.
 Polar Monobel, No. 11.
 Polar Monobel X (E.Q.S.)
 Signal Bombs.
 S.N.G.
 "Special No. 1" Dynamite.
 Stopeite—20, 25, 30, 35, 40, 50, 55 and 60 per cent.
 Stumping Powder—20 per cent.
 Submagel—60 and 75 per cent.
 Trinitrotoluene.
 Vibrex—60 per cent.

Authorized Explosives—Continued

Canadian Safety Fuse Co. Ltd.

Safety fuse—"Beaver" Brand.
Safety fuse—"Black Clover" Brand.
Safety fuse—"Black Pacific" Brand.
Safety fuse—"Clover" Brand.
Safety fuse—"Crown" Brand.
Safety fuse—"Moose" Brand.
Safety fuse—"Pacific" Brand.
Safety fuse—"White Jacket" Brand.
Safety fuse—"Yellow Jacket" Brand.
Hot Wire Fuse Lighters.
Igniter Cord—"Thermalite" Brand. Types A and B.
Primacord—Bickford Detonating Fuse.

Canadian Industries Limited (Ammunition Division)

Ammunition.
Detonators.
Dextrinated Lead Azide.
Fuse Igniting and Connecting device.
"Lead Salt".
Lead Styphnate (Normal).
Percussion Caps.
Railway Fusees.
Railway Torpedoes.
Styphnic Acid.
Tetrazene.

Authorized explosives manufactured by other than Canadian firms:

Cardox Corporation, Chicago, Ill.

Cardox.
Cardox Heaters.

Central Railway Signal Company, Boston, Mass.

Railway Torpedoes.

E. I. DuPont de Nemours & Company, Inc., Wilmington, Del.

Auxiliary Charges C. 63.
Detonators.
DuPont Bulk Powder.
DuPont Pistol Powder No. 6.
Explosive Rivets.
Fulminate of Mercury.
High Temperature E.B. Caps, No. 6.
Improved Military Rifle Powders.
Jet Tappers.
Oil Well Explosives S.O.W.E. No. 1 and EL-431-A.
"Nitramon S".
"Nitramon S" Primers.
Nitrocellulose.
Nitrostarch.
Open hole Shaped Charges (R.D.X. or Pentolite).
Perforating Shaped Charges (R.D.X. or Pentolite).
P.E.T.N.
Pyro (ground smokeless) Powder.
R.D.X. Cord.
Smokeless Powders.
Sporting Rifle Powders.
Tetryl.
Waterproof Boosters C. 66.

Ellefsens Tendskruefabrikk, Stokke, Norway

Time Fuses and Detonators for Whaling Guns.

APPENDIX E—Continued

Authorized Explosives—Continued

- Ensign Bickford Company, Simsbury, Conn.
Primacord Bickford Fuse.
Ignitacord.
- Federal Laboratories, Pittsburgh, Pa.
Lachrymatory Cartridges.
Powder Loads.
- Charles Hellis & Sons Ltd., London, England
12 Gauge Shotgun Shells.
- Hercules Powder Company, Wilmington, Del.
Detonators.
Gelatin Oil Well Explosives.
Nitrocellulose.
Smokeless Powders.
Vibro Caps.
Vibrogel B and 3.
- Illinois Powder Manufacturing Co., St. Louis, Mo.
Detonators, Gold Medal Oil Well Explosive, 100 per cent.
- Imperial Chemical Industries Limited, England
Cerium Low Tension Fuseheads.
Percussion Caps.
- Independent Eastern Torpedo Company, Findlay, Ohio.
Nitroglycerine.
- Jet Perforators Inc., Fort Worth, Texas.
Glass Gun Jet Perforating Charges, G.G. 2, G.G. 4, G.G. 7.
- Lake Erie Chemical Co., Cleveland, Ohio
Lachrymatory Cartridges.
- Lane-Wells Co., Los Angeles, Cal.
Gun Perforator Cartridges.
- Mine Safety Appliances Co., Pittsburgh, Pa.
Stud Units for Velocity Power Driver.
- Olin Industries Inc., East Alton, Ill.
(Western Cartridge Co. Division)
Cyclonite.
- Pacific Railway Signal Co., Peru, Ind.
Railway Torpedoes.
- Perforating Guns Co. Inc., Houston, Texas.
Jet Perforating Charges.
- John R. Powell, Plymouth, Pa.
Miners' Safety Squibs.
- F. J. Roberts Squib Company, Punxsutawney, Pa.
Miners' Safety Squibs.
- Shaped Charge Manufacturers Inc., Martinsburg, W. Va.
Plurajet Blasting Units (not for underground use).

Authorized Explosives—Concluded

Trojan Powder Company, Allentown, Pa.
Nitrostarch.

Western Cartridge Company, East Alton, Ill.
Detonators.
Kiln Gun Shells.

Winchester Arms Company, Cleveland, Ohio
"Tempotool" Cartridges.

Authorized Manufactured Fireworks

Fireworks manufactured by the following Canadian makers are authorized:

W. F. Bishop & Son Limited, Toronto, Ont.
Canadian Industries Limited, Montreal, Que.
Canadian Safety Fuse Company Limited, Brownsburg, Que.
Dominion Fireworks Co. Ltd., Dixie, Ont.
T. W. Hand Fireworks Co. Ltd., Cooksville, Ont.
Macdonald Metals and Plastics Limited, Waterloo, Que.
Montreal Fireworks Displays Manufacturing Company, Ville St. Pierre, Que.
Superior Toys, Waubaushe, Ont.

Certain fireworks manufactured outside of Canada by the following makers are authorized:*

Acme Fireworks Corporation (Acme Novelty Manufacturing Company), River Grove, Ill.
Aerial Products Incorporated, Merrick, Long Island, N. Y.
American Railway Signal Company, Fostoria, Ohio.
Anthes Force Oiler Company, Fort Madison, Iowa.
Atlas Fireworks Co., Inc., Los Angeles 22, Cal.
M. Backes & Sons Limited, Wallingford, Conn.
J. G. W. Berckholtz, Hamburg-Bahrenfeld, Germany.
Brookside Pyrotechnic & Chemical Co., Elkton, Md.
C. T. Brock & Co., Hemel Hempstead, Herts, England.
Central Railway Signal Company, Boston, Mass.
Columbia Manufacturing Co. Inc., Elkton, Md.
Continental Fireworks Manufacturing Co., Dunbar, Pa.
J. Halpern Co., Pittsburgh, Pa., Distributors for Lenover Corporation, Chester, Pa., and Lenover, Pa.
Thos Hammond & Company, Craigmillar, Edinburgh, Scotland.
Hudson Fireworks Display Company, Hudson, Ohio.
Hitt Fireworks Company Limited, Seattle, Wash.
Interstate Fireworks Company, Springfield, Mass.
Japan Fireworks Trading Company Ltd., Tokyo, Japan.
Jatina Manufacturing Co. Inc., Mount Vernon, N. Y.
Kent Manufacturing Corporation, Chestertown, Md.
Kilgore Manufacturing Company, Westerville, Ohio.
Lakeside Railway Fusee Company, South Beloit, Ill.
Lenover Corporation, Chester, Pa., and Lenover, Pa.; J. Halpern, Pittsburgh, Pa., Distributors.
Marutamaya Ogatsu Fireworks Co., Tokyo, Japan.
National Fireworks Incorporated, West Hanover, Mass.
Pacific Railway Signal Co., Peru, Ind.
N. V. Pyro, Klazienaveen, Holland.
Pyrowerk, Hamburg-Neugraben, Germany.
Red Flare Signal Company, Toledo, Ohio.
Reliance Snap Company, Bishop's Stortford, Herts, England.

* A list of authorized fireworks is on file in the office of the Explosives Division. Information may be obtained on request.

APPENDIX E—Concluded

Authorized Manufactured Fireworks—Concluded

Schermuly Pistol Rocket Apparatus Ltd., Newdigate, Surrey, England.
Standard Fireworks Limited, Huddersfield, England.
Standard Railway Fusee Corporation, Boonton, N.J.
J. and E. Stevens Sales Co., New York.
Thearle-Duffield Fireworks, Incorporated, Chicago, Ill.
Twin City Fireworks Company, Buffalo, N.Y.
Unexcelled Manufacturing Company, New York.
United Fireworks Manufacturing Company, Dayton, Ohio.
Van Karner Chemical Arms Corporation, New York.
Joseph Wells & Sons Limited, Dartford, Kent, England.
Joh. Chr. Wendt, Hamburg, Gr. Borstel, Germany.
Wunderkerzen-Werk Carl Fleming, Hamburg-Neugraben, Germany

Chinese firecrackers with gunpowder composition, and not exceeding 4 inches in length and 9/16 inch in diameter, and small Chinese fireworks, are authorized when found to function satisfactorily on examination at port of entry.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1954